ARGUMENTS/COMMENTS

Claims 1 through 3, 5, 6, 9, 14 and 59 through 66 are pending in the present application. Claims 1 through 3, 5, 6, 9, 14, 61 and 62 have been elected for examination. Claims 1, 3, 5 and 6 have been amended.

In the Office Action, claims 1, 2, 5, 6, 9, 14 and 62 were rejected under 35 U.S.C. 102(b) a being anticipated by U.S. Patent No. 1,841,762 to Samesreuther et al. (hereinafter "the Samesreuther et al. patent") Applicants respectfully disagree.

In the Office Action, claims 1, 14 and 61 were rejected under 35 U.S.C. 102(b) as being anticipated by Baumann (hereinafter "the Baumann patent"). Applicants respectfully disagree.

Claim 1 is directed to a heat exchanger to control the temperature of a process fluid in a reaction system. The heat exchanges includes a reaction vessel containing the process fluid; at least 5 heat transfer conduits around the circumference of the reaction vessel to provide a heat transfer surface the heat transfer conduits and the reaction vessel. The heat transfer conduits carry a flowing heat transfer fluid and no one of the at least five heat transfer conduits carries more than twenty percent of the heat transfer fluid. Each of the at least five heat transfer conduits has a length of at most twice the circumference of the vessel and a cross-sectional area of less than 80 square millimeters.

The Samesreuther et al. patent is directed to a heat exchange wall for container in which the tubes are welded and interfaced with copper to provide a heat transfer surface. The Samesreuther et al. patent is directed to qualitatively cooling or heating the contents of the container. Samesreuther does not disclose the control of a reaction.

The Baumann patent is directed to cooling pipes for a generator that having either a conical or a stepped configuration towards the exit of the pipe and varying wall thickness to provide cooling to the widely differing temperatures in the generator. Baumann is concerned with the cooling of hot ionized gas produces by a reaction performed elsewhere it is not concerned with the control of the temperature of a reaction.

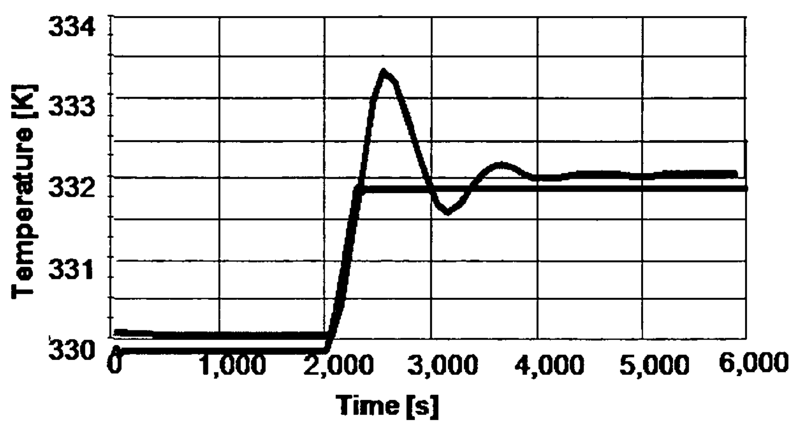
Traditional techniques for temperature control of reactions have been based on jackets around the reaction vessel providing high volumes of heat transfer fluid through single or a few conduits of large cross section. Attempts to increase the speed of response to temperature change of those systems by using a reduced the volume of fluid flowing at a faster rate failed because the fluid channelled in the conduit. This problem has been overcome by the present invention that employs a large number of conduits of small cross-sectional area allowing a much more rapid response to temperature changes.

This may be illustrated by the consideration of a batch reaction vessel with a capacity of say 5000 litres. Traditionally the temperatures of these reactions has been controlled by a jacket containing 500 to 800 litres of heat transfer fluid or by a half coil system containing 200 litres of fluid. It will be appreciated that in these systems if a change in the temperature of the heat transfer fluid is required for the control of the temperature of the process fluid it will require some time to alter the temperature of such a large volume of heat transfer fluid.

As is set out at the top of page 3 of the application much faster response and therefore improved temperature control of the reaction fluid can be achieved by employing the plurality of conduits of small cross-sectional area. This is further explained on page 25 of the application. In addition the use of these conduits allows improved temperature control to be achieved with a dramatically reduced volume of heat transfer fluid; for example, the temperature

of a 5000 litre reactor can be controlled with as little as 10 litres of heat transfer fluid.

The following is a simulated comparison of the temperature profile of the process fluid in a 4000 litre capacity reactor when the temperature of the process fluid is raised from 330K to 332K employing the present invention and with the traditional Jacket systems .



The line that peaks above 333 °K shows the temperature profile of the process fluid in a conventional system and the other line showing the profile in the system of the present invention clearly showing the improved response time of the invention with no overshot as compared with the significant lag and overshoot when employing the conventional jacket. This is counterintuitive and goes against conventional practice with surprising results. A further benefit is that the small jacket volume of heat transfer fluid employed is in this invention results in high fluid velocities that contribute to improved heat transfer.

Accordingly, independent claim 1 and dependent claims 1, 2, 5, 6, 9, 14, 61and 62 are not anticipated by either the Samesreuther et al. patent or the Baumann patent.

In the Office Action, claims 3 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Samesreuther et al patent. Applicants respectfully disagree.

Samesreuther et al. patent as indicated above does not disclose or suggest the limitations of claim 1 or the claims that depend therefrom. Accordingly, claim 3 is not made obvious by the Samesreuther et al. patent.

Reconsideration and withdrawal of the 35 U.S.C. 103(a) rejection are respectfully requested.

In view of the above, it is respectfully requested that the present application is in condition for allowance. Favorable consideration of the present application is respectfully requested. Applicants will contact the Examiner in this application to request an interview to advance prosecution.

Consideration and allowance of application is respectfully requested.

Respectfully submitted,

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